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The Role of Cognitive Behavioral Therapy in the Management of Vestibular Migraine

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Abstract:

Cognitive Behavioral Therapy (CBT) is a structured, time-limited, and evidence-based psychotherapeutic approach that focuses on identifying and modifying maladaptive patterns of thinking, behavior, and emotional responses. Developed by Aaron T. Beck in the 1960s, CBT integrates principles of both cognitive and behavioral psychology to help patients recognize the connection between their thoughts, emotions, and behaviors.

It has become one of the most widely researched and applied therapeutic modalities for a variety of psychiatric and medical conditions, including depression, anxiety disorders, obsessive-compulsive disorder, post-traumatic stress disorder, chronic pain, and insomnia. The underlying premise of CBT is that distorted cognitions and negative automatic thoughts contribute to emotional distress and maladaptive behavior, and that by restructuring these cognitions, psychological well-being can be improved.

Keywords: Cognitive Behavioral Therapy; psychotherapy; cognitive restructuring; behavioral activation; mental health; depression; anxiety; psychological intervention.

Introduction:

Cognitive Behavioral Therapy (CBT) is one of the most empirically supported psychotherapeutic approaches, widely recognized for its effectiveness across a range of psychological disorders. Recent meta-analyses have confirmed its strong efficacy in treating depression, anxiety, and other common mental health conditions **(1).**

CBT operates on the premise that an individual's thoughts, feelings, and behaviors are interrelated, and that modifying maladaptive thinking patterns can lead to emotional and behavioral improvement. By helping patients identify and restructure distorted cognitions, CBT promotes adaptive coping and emotional regulation **(2).**

In recent years, CBT has evolved through the integration of digital platforms and personalized therapeutic modules, expanding accessibility and adherence among patients worldwide. Digital CBT (dCBT) has shown promising results, especially in remote or resource-limited settings **(3).**

The Psychological Burden of Vestibular Migraine

The chronic and unpredictable nature of VM episodes can lead to significant psychological distress. Patients frequently report heightened anxiety, fear of future vertigo attacks, and depressive symptoms due to the impact on quality of life **(4).**

The relationship between vestibular symptoms and psychological distress is bidirectional. Vertigo and imbalance can trigger anxiety, while anxiety can exacerbate perceptions of dizziness and lead to maladaptive behaviors such as activity avoidance, hypervigilance, and social withdrawal **(5).**

Moreover, the central nervous system plays a pivotal role in processing both vestibular and emotional stimuli, leading to overlapping neural circuits involving the insula, anterior cingulate cortex, and amygdala. This neurobiological overlap suggests that psychological interventions could have direct effects on vestibular

symptoms. In this context, CBT, a well-established psychotherapeutic approach for anxiety and depression, may offer benefits beyond symptom management, potentially influencing the course of VM itself **(6).**

There is evidence that VM patients may come with cognitive loss, although the cognitive screening of VM patients has not been thoroughly studied. Both during migraine episodes and during free periods, there is cognitive impairment **(7).**

Cognitive Behavioral Therapy Principles and Relevance to VM

Cognitive Behavioral Therapy is a structured, time-limited, and goal-oriented psychotherapy that focuses on identifying and modifying dysfunctional thought patterns and behaviors. CBT is grounded in the cognitive model, which posits that maladaptive cognitions contribute to emotional distress and behavioral problems. By restructuring negative thoughts and reinforcing adaptive behaviors, CBT aims to improve emotional regulation and overall functioning **(8).**

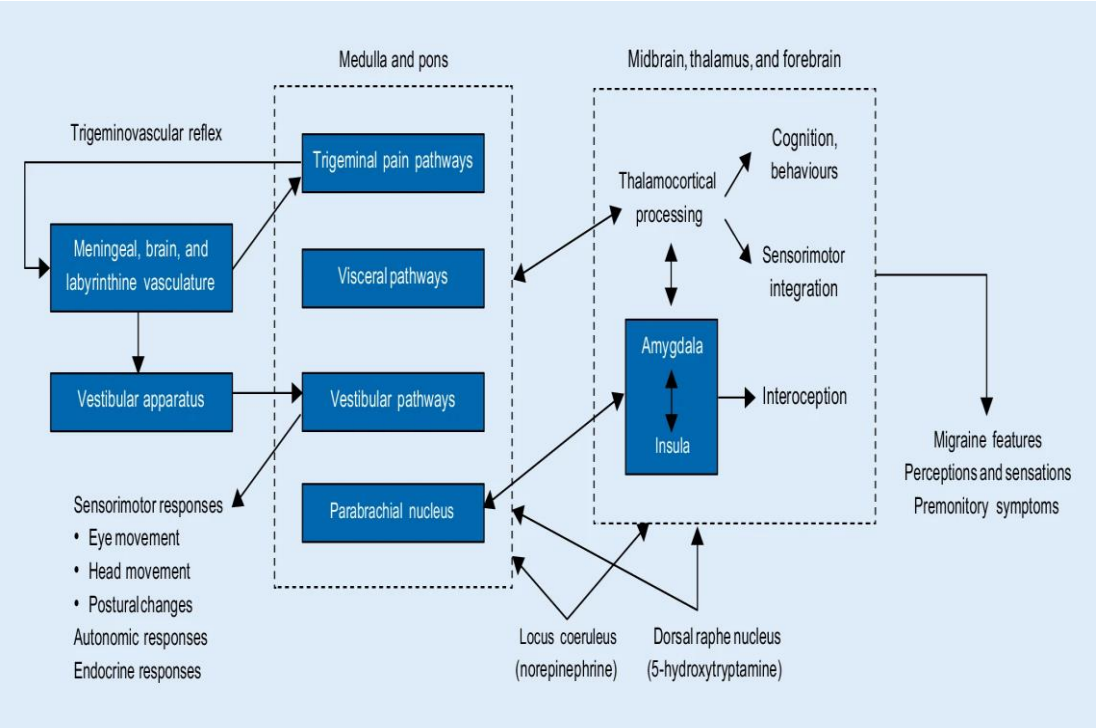

Figure (1): Pathways related to sensorimotor performance, interoceptive, and cognitive-behavioral domains within migraine circuits are shown diagrammatically **(9).**

In patients with VM, CBT targets several maladaptive cognitive and behavioral responses, such as catastrophic thinking about vertigo episodes, avoidance of motion-provoking situations, and excessive health-related anxiety. The therapy typically involves psychoeducation about VM, cognitive restructuring to challenge unhelpful beliefs, exposure to feared situations in a graded manner, and relaxation techniques to reduce physiological arousal **(10).**

CBT's relevance to VM lies in its ability to address the psychological comorbidities and maladaptive behaviors that perpetuate vestibular symptoms. Given the absence of a definitive cure for VM, enhancing coping strategies and reducing symptom-related disability can significantly improve patient outcomes.

CBT can provide talk therapy and stress management strategies to help patients understand and cope with their symptoms, focusing on the fear of falling, health anxiety, and avoidance behavior. CBT may benefit VM patients by reducing excessive physical alertness and fear of dizziness or falling down, and confronting anticipatory anxiety, and supplemental physical therapy can be performed to help patients become accustomed to exposure to reduce corresponding acute anxiety and body vigilance **(11)**

Because of its advantages, including a lack of side effects, low risk of potential harm, and convenience of administration, CBT has come to play an increasingly important role, and has received an increasing amount of attention from clinical physicians.

Evidence Supporting CBT in Vestibular Disorders

The application of CBT in vestibular disorders is supported by a growing body of literature, particularly in patients with chronic subjective dizziness, persistent postural-perceptual dizziness (PPPD), and functional dizziness. These conditions share symptomatology and pathophysiological mechanisms with VM, including central vestibular dysfunction and heightened anxiety **(5).**

A number of randomized controlled trials (RCTs) and observational studies have demonstrated that CBT can significantly reduce dizziness-related handicap, anxiety, and depressive symptoms in patients with chronic dizziness. For example, **Staab et al. (10)** found that CBT led to sustained improvements in dizziness severity and psychological distress among patients with chronic subjective dizziness. Similarly, **Holmberg et al. (12)** confirmed the efficacy of CBT in functional dizziness, with benefits maintained at follow-up.

CBT has been suggested as an effective treatment for several disorders related to dizziness and hearing, especially tinnitus and undiagnosed chronic dizziness. There is also a small literature about pediatric migraine. These are generally disorders that have no drug treatment, and the emphasis is more on adjusting to the symptoms rather than eliminating them. CBT is usually considered "the gold standard for the psychotherapeutic treatment of many or even most mental disorders **(13).**

While direct studies on CBT in VM are limited, preliminary findings are promising. A pilot study by **Kristiansen et al. (14)** evaluated a combined vestibular rehabilitation and CBT program in patients with vestibular disorders, including VM, and reported significant reductions in vertigo severity and psychological symptoms. More recently, **Cho et al. (15)** showed that CBT integrated with lifestyle modifications improved both migraine frequency and vestibular symptoms in VM patients.

Mechanisms Underlying the Effects of CBT in VM

The therapeutic effects of CBT in VM likely result from both psychological and neurobiological mechanisms. Psychologically, CBT enhances patients' sense of control over their symptoms, reduces avoidance behaviors, and corrects distorted beliefs about vertigo and health. This cognitive restructuring can break the cycle of fear and avoidance that sustains dizziness and disability **(8).**

Neurobiologically, CBT may modulate brain activity in regions involved in vestibular and emotional processing. Functional MRI studies have shown that CBT can lead to decreased activation in the amygdala and increased prefrontal cortex activity, suggesting improved emotional regulation and reduced threat perception**.** Additionally, CBT may influence vestibular compensation by promoting active engagement with movement and sensory stimuli **(5).**

CBT also reduces autonomic arousal, which is often heightened in VM patients due to anxiety. Techniques such as diaphragmatic breathing and progressive muscle relaxation can reduce sympathetic nervous system activity, thereby mitigating the physiological components of vertigo attacks **(16).**

Clinical Implementation and Practical Considerations

Implementing CBT in the management of VM requires careful patient selection, tailored interventions, and interdisciplinary collaboration. Patients with significant anxiety, phobic avoidance, or depressive symptoms are particularly good candidates. CBT can be delivered in individual or group formats, and remote options via teletherapy have gained traction, especially in the post-pandemic era **(17).**

A typical CBT program for VM spans 8–12 sessions, with initial sessions focusing on education about VM and the role of anxiety, followed by cognitive and behavioral techniques. Collaboration between neurologists, otolaryngologists, and psychologists is crucial to ensure that patients receive comprehensive care addressing both the physical and emotional aspects of VM **(18).**

Challenges to implementation include limited access to trained CBT therapists, patient resistance to psychological interventions due to stigma, and variability in symptom presentation. To overcome these barriers, raising awareness among healthcare providers about the benefits of CBT and integrating mental health services into vestibular clinics can be effective strategies.

Despite the encouraging evidence, several research gaps remain regarding the use of CBT in VM. First, high-quality randomized controlled trials specifically targeting VM patients are needed to establish efficacy and refine therapeutic protocols. Existing studies often include heterogeneous populations or combine CBT with other interventions, making it difficult to isolate its effects (15).

Second, the optimal format, duration, and components of CBT for VM have yet to be determined. Tailored approaches that incorporate elements of mindfulness, acceptance and commitment therapy or exposure therapy may enhance outcomes. Additionally, exploring biomarkers of treatment response through neuroimaging or vestibular testing could help personalize therapy **(16).**

Finally, integrating CBT into standard VM treatment guidelines requires broader recognition of the psychological dimensions of vestibular disorders. Multidisciplinary care models that incorporate CBT alongside pharmacological and vestibular rehabilitation approaches may represent the future of VM management.

Cognitive Behavioral Therapy represents a valuable addition to the therapeutic armamentarium for vestibular migraine, addressing not only the psychological distress commonly associated with the condition but also contributing to symptom reduction and improved quality of life. While the evidence base specific to VM remains limited, extrapolation from related vestibular and anxiety disorders supports its use. CBT offers a structured, effective, and adaptable approach that empowers patients to manage their symptoms, reduce disability, and regain control over their lives. As research continues to elucidate the mechanisms and refine the application of CBT in this population, it holds promise for transforming the care of patients suffering from this complex and often debilitating condition **(15).**

CBT may be useful for correcting irrational cognition of patients with VM to enable cognitive reconstruction, and combining CBT and relaxation training may reduce or eliminate anxiety, fear and other negative emotions and corresponding physiological reactions, as well as promoting the improvement of symptoms and functional recovery, thereby producing therapeutic effects **(19).**

Cognitive components:

Cognitive Restructuring:

This psychotherapeutic process of learning to identify and dispute irrational or maladaptive thoughts is known as cognitive restructuring. It is a core part of the CBT process. It entails practicing to notice when one is having an automatic negative thought and tracking the accuracy of the thought.

The main types of automatic thoughts involve self-evaluations, evaluation of others, coping strategies, and behavioral and avoidant plans. According to **Hope et al. (20)**, cognitive restructuring in CBT involves four basic steps, namely:

1. Identification of Automatic Negative Thoughts or (ANT's), which are dysfunctional or negative views of the self, world, or future based upon already existing beliefs about oneself, world, or the future.

2. Classification of the type of distorted thinking pattern in the negative thought

3. Disputing or challenging the distorted thoughts using Socratic questioning and objective reasoning by uncovering the assumptions and evidence that underpin people's thoughts in respect of problems

4. Development of rational and functional alternative thoughts

The use of cognitive restructuring in CBT is based on two main notions, namely that irrational or dysfunctional beliefs activate negative thoughts, which affect emotions and behavior, and is responsible for most psychological disorders and distress. Therefore, the central objective of cognitive restructuring is to develop alternative positive thoughts by challenging and objectively thinking about the irrational and counterproductive

nature of the negative thoughts. Of the many methods commonly used in the cognitive restructuring process: using thought records, imagery-based exposure, rational alternative, and cognitive rehearsal to modify automatic negative thoughts **(20).**

Thought records:

Another important technique in CBT to reframe a negative thought is by keeping a daily thought record. Below is an example of a though record, which is a one-page chart that allows the patient to capture his or her daily experiences and thoughts and analyze it reflectively and objectively. Thereby it is possible to recognize that automatic thoughts may not be completely true all the time and that there are more positive options that account for all evidence.

Table (1): Thought Record: **(8)**

Situation	**Emotion**	**Negative thoughts**	**Evidence for**	**Evidence against**	**Alternative thought**	**Rerate Emotion**
Where, What, WHO, When?	Describe in one word & rate 0- 100%	What thoughts, memories, or images did you have?	What facts support the validity of the thoughts?	Are there indications that this thought is not completely true all of the time?	Think of a new thought that take all evidence into account	How do you feel about the situation now? Rate again 0-100%.

It is common for patient to express doubt that this exercise will have any notable positive effect, and although it may be difficult at first and require patience, but it has been proven to work effectively. As patients become adept in completing the sheet, most find that it becomes increasingly possible to reframe a negative thought instantly without even having to write everything down any more. The thought record helps create awareness of negative thoughts and their impact on our emotions, which is a helpful start to change distorted thinking patterns. As a result, thoughts become more realistic and balanced. It allows a more functional response to challenging and distressful situations **(8).**

Figure (2): Cognitive Behavioral Therapy **(26)**.

Imagery Based Exposure (Exposure Therapy):

There are different versions of imagery exposure techniques, but one version involves bringing to mind a recent memory that provoked strong negative emotions. The therapist prompts the patient to recall and describe such a memory in high sensory detail, trying to accurately label their emotions, thoughts, and behavioral urges. Imagery based exposure is useful to reduce the level of distress and reduce avoidance coping. As a result, the patient is able to choose more positive coping actions **(21).**

Rational Alternatives and Cognitive Rehearsal:

Thought records enable patients to objectively review their thoughts for evidence in support and against its accuracy and usefulness. Thereby the patient is able to develop and implement functional alternatives for distorted thoughts and dysfunctional beliefs and behaviors. In conjunction with finding rational alternatives and balancing thoughts the therapist assists the patient to rehearse these new improved ways of dealing with a challenging or distressing situation. As a result, the patient learns to recognize cues and anticipate potentially problematic events, which makes him or her better equipped to respond more effectively whenever it actually arises.

The technique of cognitive rehearsal also facilitates better utilization of learning and socialization by moderating instinctive negative reactions. It affords the patient the opportunity to work out in advance what the most appropriate way is to respond in a difficult situation as it helps them to take the lessons of therapy into their real-world situations **(22).**

"One way of doing cognitive rehearsal is to ask the patient to take these steps: (1) think through a situation in advance, (2) identify possible automatic thoughts and behavior, (3) modify the automatic thoughts by writing out a thought change record or doing another CBT intervention, (4) rehearse the more adaptive way of thinking and behaving in your mind, and then (5) implementing the new strategy."

Behavioral Techniques:

These are used in conjunction with cognitive techniques, but are directly focused on changing behavior, primarily with the use of conditioning methods. Different from cognitive methods, behavioral techniques do not intentionally involve thoughts and feelings as primary subject of exploration and reflection, but simply prime the patient to engage in more positive behavior by repetition and positive (or negative) association.

Behavioral Activation:

The technique of behavioral activation emerged as an important change element in CBT. Typically, the patient is asked to complete a daily activity schedule for the period until the following session, ensuring that they include pleasant activities among their other responsibilities. Their adherence to this schedule is monitored, including what effect it had on emotions and behavior.

Pleasant Activities	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Impact 0-4
Thought/behavior diary	☐	☐	☐	☐	☐	☐	☐	
Pleasant events	☐	☐	☐	☐	☐	☐	☐	
Relaxation exercise	☐	☐	☐	☐	☐	☐	☐	

Figure (3): Table of daily Activity Tracking **(23).**

CBT treatment program:

Sessions were conducted every 2 weeks, with each session lasting 50 minutes, for a total of six sessions. If the patient was absent, the session was rescheduled for the following week.

Predictors of CBT Response in VM:

Not all patients with VM benefit equally from CBT, prompting interest in identifying predictors of treatment response. Baseline psychological distress, such as high health anxiety or catastrophizing tendencies, has been associated with better outcomes, likely because CBT directly targets these maladaptive patterns. Conversely, patients with cognitive impairment, low treatment motivation, or lack of insight may show reduced benefit. The presence of comorbid conditions such as generalized anxiety disorder, panic disorder, or depressive episodes can also modulate responsiveness. Personalized CBT protocols that consider these individual differences may enhance efficacy **(10).**

Outcome measures:

CBT outcome evaluation can be conducted using various methods, including quantitative, qualitative, and mixed-methods approaches

Quantitative Measures: Standardized Questionnaires and Rating Scales

Quantitative measures involve the use of standardized questionnaires and rating scales to assess patients' symptoms, functioning, and quality of life. Examples include:

- **DHI:** It's a self-administered assessment scale to measure handicaps in daily life due to dizziness. It consists of 25 items with a three-level scoring system, and severity is measured on a scale of 0 to 100 points.
- **Beck Depression Inventory (BDI)** for assessing depressive symptoms
- **Generalized Anxiety Disorder 7-item scale (GAD-7)** for assessing anxiety symptoms
- **Patient Health Questionnaire-9 (PHQ-9)** for assessing depression severity
- **The Mini-Mental State Examination (MMSE):** Despite its prevalent use, especially for people with dementia, the Mini Mental State Exam does not assess executive function impairment, requiring other tools to detect this important and complex range of cognitive, emotional and behavioral difficulties.
- **Montreal Cognitive Assessment Scale:** takes approximately 10 minutes to administer and was designed to detect mild cognitive impairment. The MoCA is a one-page, 30-point cognitive screening tool with a clinical cutoff score of 26. It assesses seven major cognitive domains; Visuospatial/Executive Functioning (5 points), Naming (3 points), Attention (6 points), Language (3 points), Abstraction (2 points), Delayed Recall (5 points) and Orientation (6 points) **(24).**
- **Elderly Cognitive Assessment Questionnaire and Abbreviated Mental Test Score** are brief screening tools effective for bedside assessments and first-level case identification in the community.

These measures provide numerical data that can be analyzed statistically to determine the effectiveness of CBT.

Qualitative Measures:

Patient Feedback and Therapist Observations. Qualitative measures involve gathering non-numerical data through patient feedback and therapist observations. Examples include:

- Patient self-reporting of symptoms and experiences
- Therapist observations of patient progress and challenges
- Semi-structured interviews to gather detailed information about patients' experiences

These measures provide rich, contextual data that can offer insights into the therapeutic process and outcomes.

Measurement timing

Regarding the timing of item measurements, for CBT, all items were measured before the treatment and after the final session of the CBT program (approximately 3 months).

Integration of CBT with Vestibular Rehabilitation Therapy (VRT)

An emerging therapeutic approach for vestibular migraine (VM) is the integration of CBT with VRT which aimed at promoting central compensation through habituation, adaptation, and substitution exercises **(25).**

However, VRT efficacy can be limited in patients with high levels of anxiety, avoidance behaviors, or poor adherence. Some patients feel very uncomfortable when exposed to eliciting stimuli, and exhibit aggravated anxiety reactions after treatment. CBT addresses these psychological barriers by targeting fear-related cognitions and enhancing motivation, which in turn facilitates greater engagement with VRT protocols. This combined strategy has demonstrated improved functional outcomes, particularly in patients with chronic symptoms or those with coexisting psychiatric comorbidities. In VM, where the vestibular and emotional circuits are closely linked, this dual-modality approach may represent a more holistic intervention **(12).**

CBT Delivery Modalities and Accessibility

The delivery of CBT has evolved significantly, with increasing reliance on digital platforms and self-help formats. Internet-based CBT (iCBT) has shown effectiveness in treating anxiety and functional dizziness, offering a feasible option for patients who cannot access in-person therapy. In VM, where symptoms like photophobia and motion sensitivity may limit travel, teletherapy can be a valuable alternative. Digital CBT platforms can include interactive modules, symptom diaries, guided relaxation exercises, and therapist support. While more studies are needed to evaluate iCBT specifically for VM, the success seen in related vestibular and anxiety disorders suggests this format may increase reach and reduce treatment barriers, especially in under-resourced settings **(26).**

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